

every case the experiment consisted in a comparison of the manuring effect of three parts of phosphoric acid in an insoluble form, with a mixture containing one part of soluble and one part of insoluble phosphoric acid. The result was somewhat in favour of the latter mixture. It will be seen at once that the experiment afforded no fair comparison of the two forms of phosphate. Besides the fatal error of mixing the soluble and insoluble phosphates together, and comparing them in unequal quantities, the amount applied to the land was far too large. Let them drill with one set of turnips 2 or 3 cwt. of superphosphate in which the whole of the phosphoric acid is soluble, and apply to another plot the same amount of phosphoric acid in the so-called insoluble form, and the result of the comparison will be very different to that at present shown.

In speaking of the effect of nitrogenous manures the report correctly states that they produce but little effect on the turnip crop. The fact is that turnips have a greater power than most farm crops of assimilating the nitrogen of the soil, and being thus able to feed themselves stand in little need of artificial help. Where, however, the soil is in an exhausted condition, nitrogenous manures will always produce a marked effect.

The analyses of the turnips grown by the experimental manures supply a variety of "new and unexpected information." Much of this is true in substance, but is already well known to agricultural chemists. We abstain from criticising, for we are sure the next report will show a far better acquaintance with the chemistry of the subject, and that the industry and zeal now displayed will finally issue in real additions to our knowledge of agricultural science.

Euclid. Books I. and II. Edited by W. H. H. Hudson, M.A. *Algebra.* By the Same. (London: The Society for Promoting Christian Knowledge).

THE *Euclid* is founded on Simson's second edition (1762). In addition to the text there are a few definitions and some judicious explanatory notes. The *Algebra* (or *Primer* as the author styles it) is divided into three parts, Part I. Notation, Addition, and Subtraction; Part II. Multiplication, Division, and Simple Equations; Part III. Measures and Multiples, Fractions, and Quadratic Equations. The proof here given of $-a \times -b = ab$, due to Euler, appears to be quite sound. Mr. Hudson states his belief that this proof was misunderstood by Mr. Mill in his criticism ("Logic," vol. ii., ninth edition, p. 408). This little work is an excellent one, and contains a vast amount of good matter in a small compass. Mr. Hudson has performed his task in no perfunctory manner. Both books are brought out with a view to teaching the subjects of which they treat as required by the new code. They are very neatly printed and got up.

LETTERS TO THE EDITOR

- [The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]
- [The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to ensure the appearance even of communications containing interesting and novel facts.]

The Magnetic Storm of May 14, 1878

IN regard to the communication on the magnetic storm of May 14, 1878, which appeared in *NATURE*, vol. xviii, p. 617, it may be interesting to add some particulars furnished by examination of the magnetic photographs of the Royal Observatory.

For some days preceding May 14 the trace of the declination magnet had been very quiet, exhibiting only the ordinary diurnal change; but on May 13, at 18h. 5m., Greenwich mean time, the character of the curve abruptly and distinctly

changed, small and frequent oscillations commencing then to be shown. At about 6h. on May 14 the north end of the needle began to move gradually in an easterly direction, and at about 9h. had reached a position twenty-five minutes of arc east of its usual position, the small oscillations still going on. No great change then occurred until 11h. 45m., when the north end of the needle began to move sharply westward. At midnight it had moved twenty minutes westward, occupying then its usual position nearly; almost immediately, however, it turned again eastward, and at 12h. 40m. had moved twenty minutes in that direction; after this time, with the exception of two smaller bends, no other unusual motion occurred, and the magnet gradually resumed its ordinary position. The small oscillations first spoken of ceased at about the time of the commencement of the first rapid motion, at 11h. 45m.

The commencement of the disturbance is not so distinctly perceptible in the trace of the horizontal force magnet, but continued small oscillations occur through the evening of May 14. At 11h. 45m. the northerly force had (gradually since 6h.) decreased nearly 0.01 part of the whole horizontal force; it then increased rapidly, and at midnight had about reached its usual magnitude; by 12h. 40m. it had again considerably diminished (but less than before), and after this time the magnet gradually resumed its usual position. The small oscillations ceased about midnight.

The vertical force magnet trace shows a few very small oscillations during the evening; after 7h. the force decreased gradually till midnight; at the latter time a sharper decrease occurred; at 12h. 30m. the force had altogether diminished by about 0.003 parts of the whole vertical force; after this time the magnet, rather rapidly at first, but afterwards more gradually, returned to its ordinary position.

The first start in the trace of the declination magnet, at 18h. 5m., is most distinct; the character of the trace definitely changes at that time. If the commencement of disturbance is as sharply indicated in the China, Melbourne, and Stonyhurst registers, we shall have here a well-established instance of simultaneous, or nearly simultaneous, action, at widely-separated parts of the earth's surface. The disturbance practically ceased at Greenwich, May 14, 16h. It was comparatively large as occurring in an otherwise quiet year. In years of activity these motions of the magnets, in amount, are, on many days, much exceeded.

WILLIAM ELLIS

Royal Observatory, Greenwich, October 12

P.S.—Earth currents were active at Greenwich during the whole period of the magnetic disturbance.

Cyclones and the Winter Gales of Europe

MR. S. A. HILL, in *NATURE*, vol. xviii, p. 617, compares together the number of hours of high wind in the British Isles with the number of West Indian cyclones observed in each year from 1869 to 1874. It may be interesting to add the result given by the Royal Observatory register. The hourly values of velocity in the years mentioned have not yet been tabulated, but adopting for comparison the number of days on which the daily velocity exceeded 500 miles, we have counted up the number of such days in each year, which numbers, for more ready comparison with those given in *NATURE*, we have multiplied by a constant. The comparison with the values previously printed in *NATURE* then stands as follows:—

	1869	1870	1871	1872	1873	1874
Cyclones (W. Indies)	0	7	3	0	1	?
Hours of high wind (British Isles) ...	714	570	537	679	571	658
Days of high wind, Royal Observatory, ...	975	525	175	725	750	575
X 25						

WILLIAM ELLIS

Royal Observatory, Greenwich, October 12

Height and Shape of Mount Hekla

I NOTICE that there is a mistake in regard to the height of Hekla in the map which accompanies my account of the eruption of February 27, 1878, for which I fear I am alone responsible. It is there stated to be 4,950 feet. The real height is 4,961 *Danish* feet = 5,108 English feet. The height has been frequently misstated. Sometimes it is asserted to be

5,700 feet, while on the other hand it has been placed as low as 4,300. It is not probable that the height has altered during the last century, for although some writers have asserted that the mountain lost 500 feet during the eruption of 1845, it has been satisfactorily proved that the crater of 1845 opened in the side of the mountain below the principal craters. The previous eruption was in 1772. Hekla is often spoken of as if it were the only volcano in Iceland, while in reality the whole island is dotted over with volcanic vents, of which Hekla is indeed the most frequently active, but by no means the highest. In fact, there are four higher mountains in the island, the highest being Oraefa Jökull—6,426 English feet.

Secondly, as to the shape of Hekla. Volcanoes often present a fairly symmetrical conical form, as we should expect from their mode of formation. This is specially the case in regard to Etna. But Hekla presents rather the appearance of a hog's back. Seen from the north or south it has a long oval outline, serrated by virtue of its three craters, and with an axis which passes from north-east to south-west. Thus the ends of the oval mass alone present the usual conical appearance of volcanoes. It is rather a line of craters than a single one; a volcanic rift elevated above the plain, with large *bocche del fuoco*. These rifts are common in all volcanic countries. In Iceland we have a notable example in Köetlagja, as we commonly call the volcano; in reality *Köetla-gja*—the Köetla rift, along the line of which various vents of fire exist. So again we have Almannagjá, the great rift at Thingvellir. In the eruption of Etna, which took place in 1865, a large rift opened in the side of the mountain, and along the line of it no less than seven small craters opened. In the last eruption of Hekla fourteen small craters opened in a line. We have to distinguish between volcanoes terminated by one large crater, which always furnishes the vent when the eruption takes place from the summit, and volcanoes terminated by a line of craters, one or other of which may be active at any one time. To the former class belong Etna and Vesuvius, to the latter Hekla and Köetla-gjá.

Apparently we cannot get out of the way of spelling Hekla *Hecle*. In one of our leading journals of October 11 I notice the spelling *Hecle*. Hekla means *hooded*, in allusion to the covering of snow, or of cloud, which so frequently rests upon its summit. *Hökull* signifies a chasuble in Icelandic. According to some writers Mount Pilatus, near Lucerne, takes its name from *Pilatus*, in allusion to its cloud-capped summit.

Marlborough College, October 13

G. F. RODWELL

Animal Intelligence

As many of the readers of NATURE have probably not seen my article on the above subject in the current number of the *Nineteenth Century*, I feel it desirable to repeat in these columns the request with which that article concludes. This request is merely that those who read it should favour me by sending to the under-mentioned address brief accounts of any well-marked instances of the display of animal intelligence which may have fallen within their own notice or that of their friends. None of these instances will be published by me without permission; but I desire to accumulate as many of such instances as possible—no matter of how dubious a character—in order that I may obtain a wide basis of suggestion as to the directions in which experiments may be most profitably employed. I may add that as the effect of publishing this invitation in the *Nineteenth Century* has been that of burying my desks in a snow-storm of letters, I should like to take this opportunity of explaining to past and future correspondents that I do not esteem their kindness the less because its bounty is too great for me to acknowledge in individual cases.

GEORGE J. ROMANES

18, Cornwall Terrace, Regent's Park, N.W., October 15

The Microphone as a Receiver

I HAVE made some experiments which seem to throw light on the fact mentioned by Prof. Hughes and also by Mr. Blyth (NATURE, vol. xviii. p. 172), that the microphone, or a jar with gas cinders, may act as a receiver.

A Morse-key is set on a sounding-box; one pole of an intermitting current is connected with the lever; the other pole with the fore-part of the key (which for telegraphing purposes is connected with the positive pole of the sending battery). By regulating the screw, which is found at the after-part of the key (which for telegraphing purposes is connected with the coil

of the electro-magnet), a slight contact is made between the lever and the fore-part of the key, and directly a very distinct sound is heard of the same character as that of the sound emitted by the interrupting apparatus.

A very good form of the same experiment is the following:—A leaden cylinder and a rocker are taken as used in the experiment of Trevelyan; the rocker is placed on the cylinder, and is, moreover, supported by a sharp edge; if necessary pressure downwards is applied on the stem, in order to prevent the pressure of the rocker on the cylinder being too great. The cylinder is connected with one pole of the intermitting current, the stem of the rocker with the other pole. If the pressure of the rocker on the cylinder be regulated well, a very low sound is produced, specially when the rocker is an iron one. A copper rocker or a copper plate also gives good results. The cylinder was placed on a sounding-box.

An intermitting current sent through the microphone of Prof. Broun (NATURE, vol. xviii. p. 383), as also through a jar with gas cinders, gives a feeble though perfectly audible sound. By using a stronger current, I believe the sound would have been louder. My battery was of four Bunsen cells.

In my opinion the only possible explanation of these facts is the following:—The resistance at the places of contact being relatively very great, a good part of the heat generated by the current appears here, and by dilatations the lever of the Morse-key or the rocker is uplifted. During the interruptions of the current the heat is diffused, and the lever or the rocker falls back, to be again uplifted in the next period of closed current. In this way the lever or the rocker acquires an oscillation of the same period as that of the intermitting current. That a sufficient diffusion of heat in so short a time is possible may be seen from the Trevelyan experiment itself.

My conclusion is that the action of the microphone or of the jar with gas cinders as a receiver depends upon the varying dilatation at the points of contact by the varying intensity of the current.

V. A. JULIUS

Breda, Holland, October 12

Power of Stupefying Spiders possessed by Wasps.—Mimicry in Birds

MR. CECIL's remarks on the spider-hunting wasp (NATURE, vol. xvii. p. 381) have interested me greatly, these wasps being very common here. Two species are continually hovering about the wall-plates and eaves of my house in search of their prey, which they hunt out with most praiseworthy perseverance. Both are thin-bodied, but one is half as long again and has a larger body, as also broader black rings than the other. A few remarks may be of interest to your readers.

These wasps build variously-shaped mud nests, which are met with hanging from twigs in the bush or stuck on walls in houses and under overhanging rocks. Some species use a red sandy loam, others common mud.

The nest is divided into compartments, each of which contains an ovum, and is filled with spiders, on which the larve feed.

For a long time I was under the impression that these spiders were killed outright, and was puzzled to find them perfectly fresh and juicy after a lapse of a fortnight, with a thermometer ranging up to 118° in the shade; but a few days ago I broke open a large nest, and was astonished to notice a constant movement in the legs of half-a-dozen spiders which were contained in one cell.

I have since then examined several nests, and invariably with the same result.

Mrs. Hubbard's explanation of the tracking described by Mr. Cecil (NATURE, vol. xvii. p. 402) is no doubt correct as far as it goes, but the wasps here seem to "go in" for every and all species of spiders, with only one exception.

My house abounds with a podgy black spider having a bright vermilion patch on the medial line of the body and two bright spots above this patch. This insect is a most venomous and dangerous neighbour; its bite is highly poisonous and inflicts excruciating agony on the person or animal bitten. I have seen a terrier succumb to its effects in eight hours, and one young man went mad in 1868 from the effects of a bite received in the wrist. Several persons have been bitten here during the last two years, and only the immediate use of ammonia and spirits saved them from serious injury. This spider is carefully avoided by the wasp, who immediately retreats on discovering that the occupant of a web belongs to this species.